



SELF-HELP: CLINICIAN SECTION

The relationship of the sacroiliac joint, stabilization musculature, and lumbo-pelvic instability[☆]

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Introduction

The sacroiliac (SI) joints as a source of low-back trouble need very little justification to pain specialists. Pain from the SI joints has been proven to cause not only low-back pain, but also groin and thigh pain (Schwarzer et al., 1995). This pain distribution and palpable tenderness caudal to the posterior superior iliac spine are fairly reliable indicators that the pain generator is the SI joint (Fortin, 1998). Surprisingly, traditional orthopedic tests are not very reliable. Joint motion palpation tests are also unreliable if used alone.

It is hypothesized that lumbo-pelvic pain can be due to overloading of the ligaments of the pelvic ring and/or lumbo-pelvic junction during activities in which loads have to be transferred between legs and trunk (Mens et al., 1996, 1999; Snijders et al., 1993). It has been shown that insufficiency can arise due to poor function of stabilization musculature (O'Sullivan et al., 2002). This is a particularly important problem in women following childbirth in whom posterior pelvic pain is such a common disorder (Mens et al., 2001).

Clinical biomechanics of the SI joints

The self-locking mechanism of the pelvis is called form or force closure. Form closure is a feature of the anatomy of the SI joints, mainly their flat

surfaces, and promotes stability. Unfortunately, these flat surfaces are vulnerable to shear forces such as can occur during walking. Recent work by Pool-Goudzwaard et al. (1998) has demonstrated how muscles, ligaments and the thoracolumbar fascia aid in stabilizing the pelvis, thus achieving force closure. This is necessary during walking when unilateral loading of the legs introduces shear forces, and the muscle-ligament-fascia system is required to stabilize the pelvis by compressing the SI joints.

The sacrotuberous and long, dorsal sacroiliac ligaments are responsible for limiting nutation and counter-nutation, respectively. Insufficient ligamentous tension will decrease force closure. Three muscle slings—a longitudinal, a posterior oblique and an anterior oblique sling—are the active components in the pelvic stabilization system (see Figs. 1 and 2). The muscular slings are described in Table 1.

Assessment

Pain provocation, mobility and stability of the pelvis should all be tested. Individual motion palpation tests are not reliable, but when a battery of reliable SI tests are used together, a valid classification of the patient as having SI dysfunction can be made (Erhard and Delitto, 1994).

A new stability test called the active straight-leg-raising test (ASLR) has been described by Mens et al. (1996, 1999). This test can be used to verify

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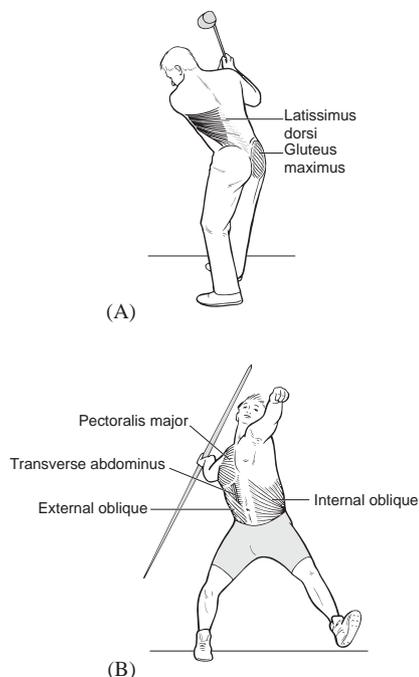


Figure 1 Oblique muscle slings: (A) Posterior oblique sling and (B) anterior oblique sling.

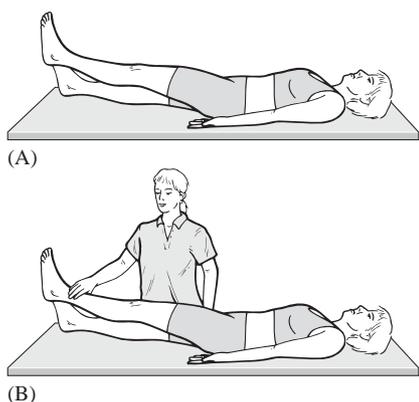


Figure 2 Active straight leg raise test: (A) ASLR versus gravity and (B) ASLR with manual resistance.

which SI joint is unstable and as a post-treatment check to determine if a trial treatment is of value (see [Table 2](#)).

The active straight leg raise test (ASLR) has been shown to be associated with postpartum sacroiliac (SI) pain ([Mens et al., 2001](#)). Mens asked the patient to score impairment on a six-point scale:

- Not difficult at all = 0
- Minimally difficult = 1
- Somewhat difficult = 2
- Fairly difficult = 3
- Very difficult = 4
- Unable to do = 5.

Table 1 Muscle slings responsible for force closure of the SI joints.

Longitudinal sling

Multifidus attaching to the sacrum
Deep layer of the thoracolumbar fascia
Long head of biceps attaching to the sacrotuberous ligament

Posterior oblique sling

Latissimus dorsi and contralateral gluteus maximus, biceps femoris

Anterior oblique sling

Pectorals, external oblique, transverse abdominus and internal oblique

Other muscles

Diaphragm
Pelvic floor

Table 2 Active straight leg raising test.

Patient lies supine with the legs 20 cm apart
Actively lifts one leg 20 cm up following the instruction, "Try to raise your legs, one after the other, above the couch for 20 cm without bending the knee."

Test is positive if:

The leg cannot be raised up
Significant heaviness of the leg
Decreased strength (doctor should add resistance)
Significant ipsilateral trunk rotation

Improvement should be noted:

Manual compression through the ilia
SI belt tightened around the pelvis
Abdominal hollowing

The scores of both sides were added, so that the summed score ranged from 0 to 10.

The test-retest reliability measured with Pearson's correlation coefficient between the two ASLR scores 1 week apart was 0.87; the ICC was 0.83. Sensitivity was 0.87 and specificity was 0.94 ([Mens et al., 2001](#)).

It has been shown that altered kinematics of the diaphragm and pelvic floor are present in those with a positive ASLR test ([O'Sullivan et al., 2002](#)).

Additionally, manual compression through the ilia normalizes these altered motor control strategies ([O'Sullivan et al., 2002](#)).

Treatment

Treatment encompasses *advice*, *manipulation* and *exercise*. Offer *advice* about lumbopelvic posture during sitting, standing, walking, lifting and carrying activities. In particular, give advice to avoid creep during prolonged sitting. Also, a SI stabilization belt may be indicated until neuromuscular control of posture is reeducated subcortically.

Manipulation or mobilization of the blocked SI joint may be needed. Other manual or semiactive therapy to consider includes myofascial release of the lumbodorsal fascia and postisometric relaxation of the adductors, piriformis, hamstrings, quadratus lumborum, iliopsoas, latissimus dorsi, erector spinae or tensor fascia lata.

Exercise should focus on reactivating the deep intrinsic stabilizers such as the transverse abdominus, internal oblique abdominals and multifidus muscles. The quadratus lumborum, gluteus medius, gluteus maximus and latissimus dorsi may also require endurance training. In particular, functional core exercises training stability patterns in movements and positions similar those of daily life, recreation and sport, or occupational demands. For instance, squats, lunges, pushing and pulling movements.

Summary

The SI joints are an important source of pain and activity intolerances. Force closure of the SI joints requires appropriate muscular, ligamentous and fascial interaction. The ASLR test can help to determine if a specific treatment is effective.

Advice about posture and support, manipulation of the SI joints along with manual therapy of related muscles and fascia, and exercise of key stabilizers are all important components in reestablishing lumbopelvic stability.

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